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Total Number of Pages in This Submission

Application Number	10/749,874
Filing Date	December 31, 2003
First Named Inventor	Rene Purnadi
Art Unit	2666
Examiner Name	Mehra, Inder P.
Attorney Docket Number	944-001.124

ENCLOSURES *(Check all that apply)*

- ☐ Fee Transmittal Form
  - ☐ Fee Attached
- ☐ Amendment/Reply
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Reply to Missing Parts/ Incomplete Application
  - ☐ Reply to Missing Parts under 37 CFR 1.52 or 1.53
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- ☑ Other Enclosure(s) (please Identify below):

Remarks

Amended brief for appellants in response to notice of non-compliant appeal brief (sent in triplicate).

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	Ware, Fressola, Van Der Sluys & Adolphson LLP		
Signature			
Printed name	James A. Retter		
Date	March 20, 2007	Reg. No.	41,266

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

First named inventor: Rene Purnadi

Serial No.: 10/749,874

Filed: Dec. 31, 2003

Title: METHOD AND EQUIPMENT FOR LOSSLESS PACKET DELIVERY TO A MOBILE TERMINAL DURING HANDOVER

Group Art Unit: 2666

Examiner: Mehra, Inder P.

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AMENDED BRIEF FOR APPELLANTS

IN RESPONSE TO NOTICE OF NON-COMPLIANT APPEAL BRIEF

Sir:

This is an amended brief for an appeal from an Office Action mailed 10 August 2006, made final, to which applicant filed a request for reconsideration and in response received an Advisory Action, mailed 13 Nov. 2006, maintaining the rejections, and further in response to a Notice of Non-compliant appeal brief, mailed 16 March 2007, noting that the appeal brief as originally filed did not indicate in the statement of status of claims, which claims are being appealed. This amended brief is believed compliant.

Following a phone call to the Examiner on 8 Nov. 2006 in which the Examiner indicated an Advisory Action would be mailed (and was mailed on 13 Nov. 2006), applicant mailed a Notice of Appeal on 10 Nov. 2006. This brief follows that timely filed Notice of Appeal.

For all of the reasons given below, it is the belief of the undersigned that the claims of the application do distinguish the

invention from the art relied on by the Examiner. Nevertheless, the undersigned is always willing to discuss possible amendments to any claims to clarify or resolve any issues related to claim interpretation that may remain after the Examiner has reviewed applicant's brief. The Examiner is strongly encouraged to call the undersigned to discuss making any such amendments.

Table of Contents

I. THE REAL PARTY IN INTEREST

The real party in interest is Nokia Corporation, having a principal place of business at Keilalahdentie 4, FIN-02150 Espoo, Finland.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-26 are pending. Claims 21-26 and 28 are allowed, claims 1-3, 18-20 and 27 are rejected, and claims 4-17 are objected to. Of the claims rejected, only claims 1 and 27 are independent. All of the dependent rejected claims depend from claim 1 and are rejected based on the rejection of claim 1.

The rejections of claims 1 and 27 are appealed.

All of the other rejected claims depend from either claim 1 or claim 27. Only the rejections of claims 1 and 27 are argued, and it is asserted here that the rejections of those claims is error, and so then are all of the rejections.

IV. STATUS OF AMENDMENTS

No amendments have been filed since the mailing of the final Office action.

V. SUMMARY OF CLAIMED SUBJECT MATTER

Applicant provides herewith a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number, and to the drawings, by reference characters.

Claims 1 and 27 are to a method and apparatus, respectively (and as explained below), enabling wireless transmission of

packets according to a layered protocol for packet transmission, the layered protocol including a radio layer as a lower layer and including an upper layer that provides packets to the radio layer for wireless transmission. The invention could be used e.g. by a radio access network transmitting packets to a user equipment wireless communication terminal.

As explained in the application at page 7, lines 14-24, the invention introduces use of a ("loose") "local acknowledgement" (local ACK) mechanism by which the upper layer is able to monitor transmission (over the air) of packets via the radio layer (which transmits packets as one or more radio frames via the physical layer), which also maintains a buffer. As explained beginning at page 1, line 5, to page 3, line 2, the invention is motivated by the belief that because of higher data rates envisioned in the future and because radio frames are radio technology specific in a multiple radio technology environment, it would be beneficial to have the send/ transmit buffer maintained not in the radio layer, but in an upper protocol layer, where the data units being transmitted can (and typically do) exist as radio technology independent packets.

The invention though, does not simply move the send/ transmit buffer to an upper layer, but instead allows for the continued use of a transmit buffer by the radio layer and also allows for use of a transmit buffer by an upper layer, and provides for a mechanism believed not unduly burdensome by which the upper layer can maintain its transmit buffer. The mechanism provided by the invention is not unduly burdensome because instead of a "tight" local acknowledgement scheme, in which the upper layer would buffer a packet and remove it only when it received a local ACK (an ACK from the radio layer to the upper layer) thus ensuring lossless transmission, the invention provides what is called "loose" local acknowledgement (which does not guarantee lossless transmission), in which a local ACK is provided by the radio layer to the upper layer only under some

circumstances, i.e. only on the occurrence of one or another predetermined event, and the upper layer uses a process called here "slow release" to keep its buffer from overflowing between these predetermined events. In slow release, when its buffer is full, the upper layer removes the oldest packet from its buffer when a new packet arrives, i.e. the removal is prompted by the arrival of a new packet and the buffer being full, and is not triggered by having received a local ACK. A local ACK, as explained at page 9, lines 10-19, can be provided along with a sequence number, and in response to such a local ACK and sequence number, the upper layer would remove the packet having the sequence number as well as all older packets; thus one local ACK could free up all or a large part of the transmit buffer of the upper layer. As explained at page 9, lines 3-6, the predetermined events that would trigger the radio layer sending a local ACK to the upper layer could be a handover, or a degrading of the radio link condition (as reflected e.g. through the error rate or the retransmission rate). Thus, these events need not have anything to do per se with the radio layer having received an ACK for a packet from a peer radio layer in the communication terminal to which the packet was transmitted, but are merely events predetermined as appropriate for triggering sending a local acknowledgement, the idea here being that it is not efficient for the radio layer to send a local ACK to the upper layer each and every time the radio layer receives an ACK from its peer.

The application explains at page 8, line 3, by reference to Figure 1, that a radio access network 16 implementing the invention would include an access point 12 (such as a Node B in 3G, an Access Point in Wireless LAN, or a base station in 2G) having a radio link to a mobile terminal 11, and also a controller 14 (such as a radio network controller in 3G, an Access Point in Wireless LAN, or a base station controller in 2G). The radio layer exists in the access point 12, and

depending on the cellular network, the upper layer could reside in the controller 14, although it is possible that it could instead reside in the access point 12. The acknowledgment is referred to as "local ACK" because it is ACK signalling between two protocol layers that can exist in the same device--the access point 12, depending on the release of the radio access network--or that can exist in an access point 12 and its (serving) controller 14.

Claim 1 recites a method comprising: an upper layer of the communication protocol (see Figure 1, controller block 14 indicated as hosting the upper layer) performing a slow release (see Figure 2, block 23) in which the upper layer removes from a buffer maintained by the upper layer the oldest packet in the buffer when the buffer is full and a new packet arrives, and does so independently of whether the oldest packet has been acknowledged by a radio layer (the radio layer is shown in Figure 1 as included in block 12, which indicates an access point (AP)) that receives data as packets from the upper layer and prepares the packets for wireless transmission (see the application at page 9, lines 16-17, and see the description of "slow release" at page 8, lines 21-27); and the radio layer performing a local acknowledgement in which the radio layer sends a local acknowledgement to the upper layer on the occurrence of a predetermined event (see Figure 2, block 24, and the application at page 8, lines 14-17, and page 9, lines 1-9) the local acknowledgement indicating to the upper layer that the radio layer has received from a peer radio layer an acknowledgement that a packet has been successfully transmitted (see page 8, lines 21-24, and see page 9, lines 9-12).

The "slow release" is described in the application as being performed in a "normal mode" of buffer management by the upper layer, and the sending of a (first) local ACK triggers what in the application is called "special mode," in which the radio layer in effect causes the upper layer to remove packets from its

buffer, starting with the packet having a sequence number provided with the local ACK, and also all older packets.

Claim 27 is to an apparatus, comprising: an upper layer of a communication protocol for wireless communication of packets (see Figure 1, controller block 14 indicated as hosting the upper layer), configured to perform a slow release (see Figure 2, block 23) in which the upper layer removes from a buffer maintained by the upper layer the oldest packet in the buffer when the buffer is full and a new packet arrives, and does so independently of whether the oldest packet has been acknowledged by a radio layer (the radio layer is shown in Figure 1 as included in block 12, which indicates an access point (AP)) that receives data as packets from the upper layer and prepares the packets for wireless transmission ; and the radio layer (Figure 1, block 12), configured to perform a local acknowledgement in which the radio layer sends a local acknowledgement to the upper layer on the occurrence of a predetermined event (see Figure 2, block 24, and the application at page 8, lines 14-17, and page 9, lines 1-9), the local acknowledgement indicating to the upper layer that the radio layer has received from a peer radio layer an acknowledgement that a packet has been successfully transmitted (see page 8, lines 21-24, and see page 9, lines 9-12).

Claims 1 and 27 thus recite corresponding limitations.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are to be reviewed:

the rejection of claims 1 and 27 under 35 USC §103 as being unpatentable over U.S. Pat. No. 6,816,471 to Ludwig *et al.* in view of U.S. Pat. No. 6,490,251 to Yin *et al.*

VII. ARGUMENT

Both claims 1 and 27 require an upper layer performing slow release (i.e. release independently of having received a local

acknowledgement), and a radio layer performing local acknowledgement (i.e. indicating to the upper layer, on the occurrence of a predetermined event, that an acknowledgement has been received from a peer radio layer in the receiving wireless terminal).

In the final Office action, the Examiner first asserts that Ludwig discloses the local acknowledgment at col. 8, ll. 8-32, of Ludwig, because "The reference discloses link reset corresponds to predetermined event and providing information to L3 layer corresponds to claimed step of sending local acknowledgement." The Examiner then concedes that Ludwig fails to disclose a step of slow release, but that Yin discloses such a step, at col. 8, ll. 14-20, where, the Examiner asserts, "Yin discloses an upper layer removing from the buffer maintained by the upper layer the oldest packet in the buffer when the buffer is full and in IP the oldest packet gets dropped first independently of whether the oldest packet has been acknowledged or not."

Applicant respectfully submits that first, Ludwig in fact fails to disclose the local acknowledgement of claims 1 and 27. Next, since the Examiner relies on Ludwig for a teaching of local acknowledgement and relies on Ludwig in combination with Yin for slow release, the combination cannot teach slow release, since one cannot have slow release without local acknowledgement, and Ludwig does not teach local acknowledgement.

So now first in respect to local acknowledgement, applicant respectfully insists that Ludwig discloses at the cited location (col. 8, ll. 8-32) only that the L2 layer must always keep track of which L3 data units are included in which L2 data units, and that there is no teaching by Ludwig of the L2 layer (asserted by the Examiner to correspond to the recited radio layer) sending a local acknowledgement to the upper layer on the occurrence of a predetermined event, whether the event is a 'reset conditions without a handover' or any other event. Ludwig at col. 8, lines 8-32, reads:

> Now an example will be described, in which a link reset occurs, i.e. the resetting of the data unit numbering, without a handover. In other words, the sending and receiving peers remain the same, but the numbering of the I-mode data units is reset, e.g. due to a given error condition. In this case, the sending peer will simply renumber the L2_ARQ data units in its send buffer in such a way that the first L2_ARQ data unit of the new sequence is the first L2_ARQ data unit associated with the last L3 data unit that was not completely acknowledged. In other words, when considering the example shown in FIG. 5, if one assumes that L2#1 to L2#3 have been acknowledged, which means that L3#1 has been acknowledged, the new sequence will begin with L2#3 as its first data unit, because L3#2 was not fully acknowledged prior to the reset. In this way there is no possibility of data loss in the course of the reset.

Applicant respectfully insists there is simply no disclosure here of any communication from the L2 layer to the L3 layer. (The statement in Ludwig at col. 8, line 24, that "L3#2 was not fully acknowledged" means that all of the L2 data units conveying it were not all acknowledged to the L2 layer *by the peer L2 layer*, as is apparent from col. 7, ll. 23-30.) The recited local acknowledgement would require that the (transmitting) L2 layer actually communicate to the L3 layer an acknowledgement of successful transmission of a packet by the (transmitting) L2 layer to the peer (receiving) L2 layer (based on the peer L2 layer ACKs to the transmitting L2 layer).

In response to the final Office action, applicant requested that the Examiner more specifically point out where Ludwig teaches the local acknowledgement recited in claims 1 and 27. In response, in a phone call with the Examiner on 8 Nov. 2006, for a disclosure of "local acknowledgement," the Examiner referred applicant's attorney to col. 7, lines 59-64, which reads:

> In the second line, it can be seen that the acknowledgment of L2#1 to L2#3 means that L3#1 has been completely acknowledged, such that L2#1 and L2#2 may be deleted, but due to the fact that L2#4 has not been acknowledged, L2#3 may not be deleted as L2#3 also is associated with L3#2.

The notation L2#1 at col. 7, lines 59-64, of Ludwig, means a number 1 segment of a layer 2 PDU. See col. 7, line 28, explaining that L2#1-L2#5 indicates 5 L2_ARQ data units into which three L3 data units are segmented.[1]

Applicant respectfully submits that (like the col. 8 text relied on in the final Office action) the col. 7 text too fails to teach the recited local acknowledgment. The col. 7 text explains only that when the *non-local* acknowledgement of L2#1 to L2#3 is made (i.e. when the receiving L2 layer acknowledges L2#1 to L2#3 by sending an ACK to the sending L2 layer), the L2 layer at the sending end knows the L3#1 has been received in total. But Ludwig does not teach that L2 at the sending end then tells L3 at the sending end that L3#1 has been acknowledged. Ludwig says that "the acknowledgment of L2#1 to L2#3 *means* that L3#1 has been completely acknowledged." [Emphasis added.] There is no teaching of L2 then so informing L3, as would be required for there to be a local acknowledgement as in claims 1 and 27.

The Examiner is less specific in the Advisory action as to where local acknowledgement is to be found, asserting there only that:

> ... acknowledgement by L2 (lower radio layer) to L2 (upper layer), refer to fig. 4-5, is local acknowledgement.

Figures 4 and 5 are described at col. 6, beginning line 39, to col. 8, ending line 7, which encompasses the text believed specifically relied on (col. 7, lines 59-64) per the telephone interview of 8 November 2006.

For these reasons, Ludwig cannot fairly be said to teach the local acknowledgement recited in claims 1 and 27, and thus the combination of Ludwig and Yin cannot be said to teach the slow

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[1] There is an obvious mistake at col. 7, line 27, where it is said that "An L2_ARQ protocol entity has segmented three L3 data units, denoted L1#-L3# into five L2_ARQ data units, denoted L2#1-L2#5." This clearly should say: "An

release recited in claims 1 and 27, since the Examiner relies on Ludwig as teaching the slow release, when in fact Ludwig provides no such disclosure.

But further and now specifically in respect to the slow release, applicant sees that Yin discloses some entity dropping a packet from a buffer because the queue length size exceeds the maximum queue size (MQS), but does not see that the entity doing so is an upper layer relative to a lower layer that receives data as packets from the upper layer and prepares the packets for wireless transmission, as required by claims 1 and 27. Applicant therefore respectfully submits that Yin cannot be relied on, as the Examiner has, for teaching the slow release recited in claims 1 and 27, irrespective of whether Ludwig can be relied on for teaching local acknowledgement.

For the reasons given, then, applicant respectfully submits that the rejections of claims 1 and 27 under 35 USC §103 are error. Consequently, the rejections of claims 2-3 and 18-20 are also error, by virtue of their dependencies.

Respectfully submitted,

20 March 2007
Date

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L2_ARQ protocol entity has segmented three L3 data units, denoted *L3#1-L3#3* into five L2_ARQ data units, denoted L2#1-L2#5."

VIII. CLAIMS APPENDIX

The following are the claims involved in the appeal.

1. (Previously presented) A method, comprising:

an upper layer of a communication protocol for wireless communication of packets performing a slow release in which the upper layer removes from a buffer maintained by the upper layer the oldest packet in the buffer when the buffer is full and a new packet arrives, and does so independently of whether the oldest packet has been acknowledged by a radio layer that receives data as packets from the upper layer and prepares the packets for wireless transmission; and

the radio layer performing a local acknowledgement in which the radio layer sends a local acknowledgement to the upper layer on the occurrence of a predetermined event, the local acknowledgement indicating to the upper layer that the radio layer has received from a peer radio layer an acknowledgement that a packet has been successfully transmitted.

2. (Previously presented) A method as in claim 1, wherein in performing the local acknowledgement, the radio layer includes with the local acknowledgement a sequence number.

3. (Previously presented) A method as in claim 2, wherein the upper layer removes the packet in the buffer having a sequence number equal to the sequence number included with the local acknowledgement, and also removes all older packets in the buffer.

18. (Previously presented) A method as in claim 1, wherein in performing the local acknowledgement the radio layer signals to the upper layer a release of the buffer to a target entity.

19. (Previously presented) A computer program product

comprising: a computer readable storage structure embodying computer program code thereon for execution by one or more computer processors in a radio access network, with said computer program code characterized in that it includes instructions for performing the method of claim 1.

20. (Previously presented) A radio access network comprising equipment having means for performing the slow release and means for performing the local acknowledgement of the method of claim 1.

27. (Previously presented) An apparatus, comprising:

an upper layer of a communication protocol for wireless communication of packets, configured to perform a slow release in which the upper layer removes from a buffer maintained by the upper layer the oldest packet in the buffer when the buffer is full and a new packet arrives, and does so independently of whether the oldest packet has been acknowledged by a radio layer that receives data as packets from the upper layer and prepares the packets for wireless transmission; and

the radio layer, configured to perform a local acknowledgement in which the radio layer sends a local acknowledgement to the upper layer on the occurrence of a predetermined event, the local acknowledgement indicating to the upper layer that the radio layer has received from a peer radio layer an acknowledgement that a packet has been successfully transmitted.

IX. EVIDENCE APPENDIX

No evidence has been submitted under Rules 1.130, 1.131, or 1.132 and relied on by appellant in the appeal, nor is there any other evidence entered by the examiner and relied up on by appellant in the appeal.

X. RELATED PROCEDINGS APPENDIX

There are no and have been no related proceedings, and so there are no corresponding decisions rendered by a court or the Board in any related proceeding.